

## LoCKAmp: Lab-on-PCB technology for <3 minute virus genetic detection

Sotirios Papamatthaiou,<sup>\*a</sup> James Boxall-Clasby,<sup>b</sup> Edward J.A. Douglas,<sup>c</sup> Pawel Jajesniak,<sup>d</sup> Hadrien Peyret,<sup>e</sup> June Mercer-Chalmers,<sup>a</sup> Varun K. S. Kumar,<sup>a</sup> George P. Lomonossoff,<sup>e</sup> Julien Reboud,<sup>d</sup> Maisem Laabei,<sup>c</sup> Jonathan M. Cooper,<sup>d</sup> Barbara Kasprzyk-Hordern<sup>b</sup> and Despina Moschou<sup>a</sup>

<sup>\*</sup> corresponding author

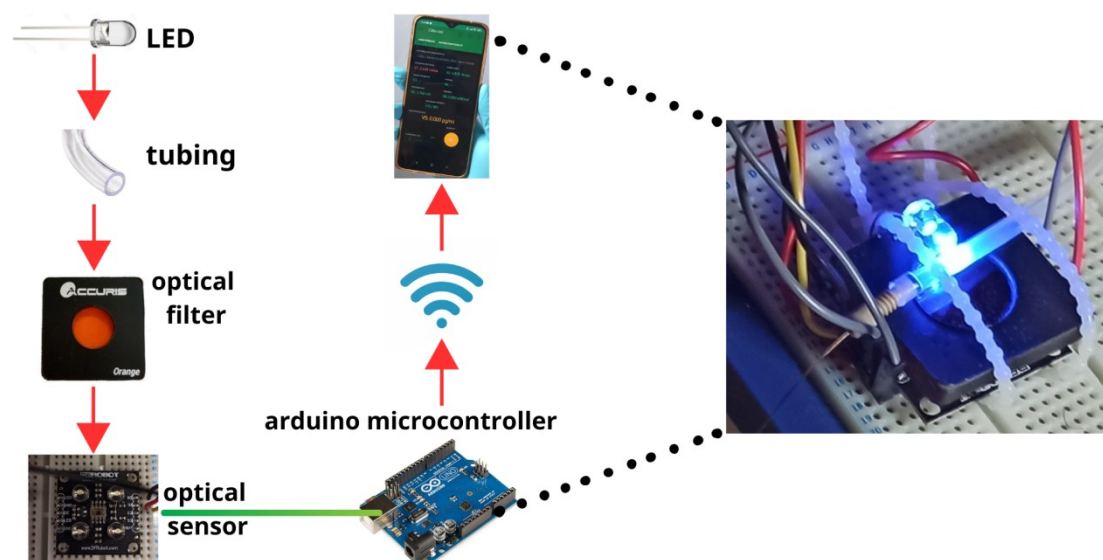
<sup>a</sup>Department of Electronic and Electrical Engineering, University of Bath, Bath BA2 7AY, UK.

<sup>b</sup>Department of Chemistry, University of Bath, Bath BA2 7AY, UK.

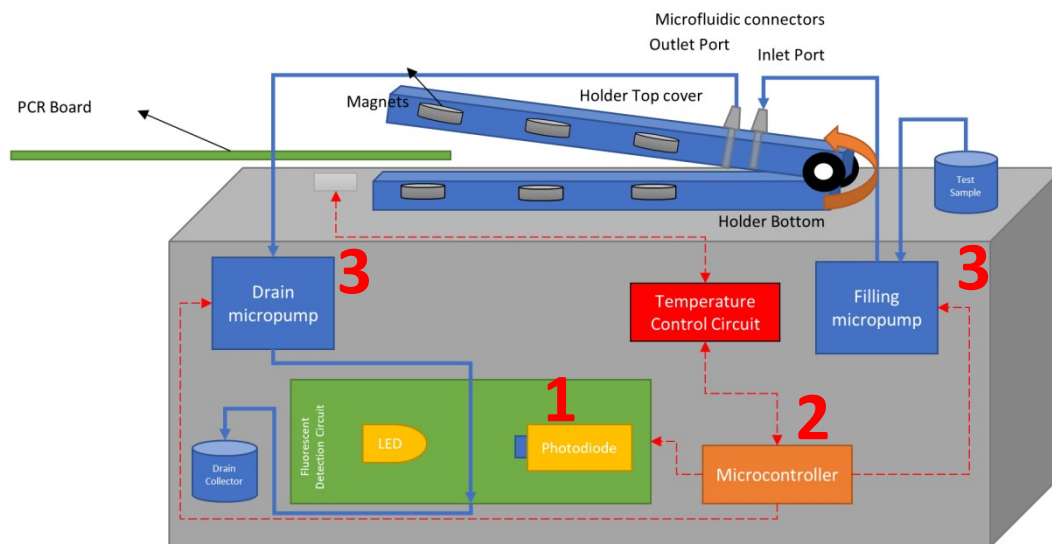
<sup>c</sup>Department of Life Sciences, University of Bath, Bath BA2 7AY, UK.

<sup>d</sup>Division of Biomedical Engineering, James Watt School of Engineering, University of Glasgow, Glasgow, UK.

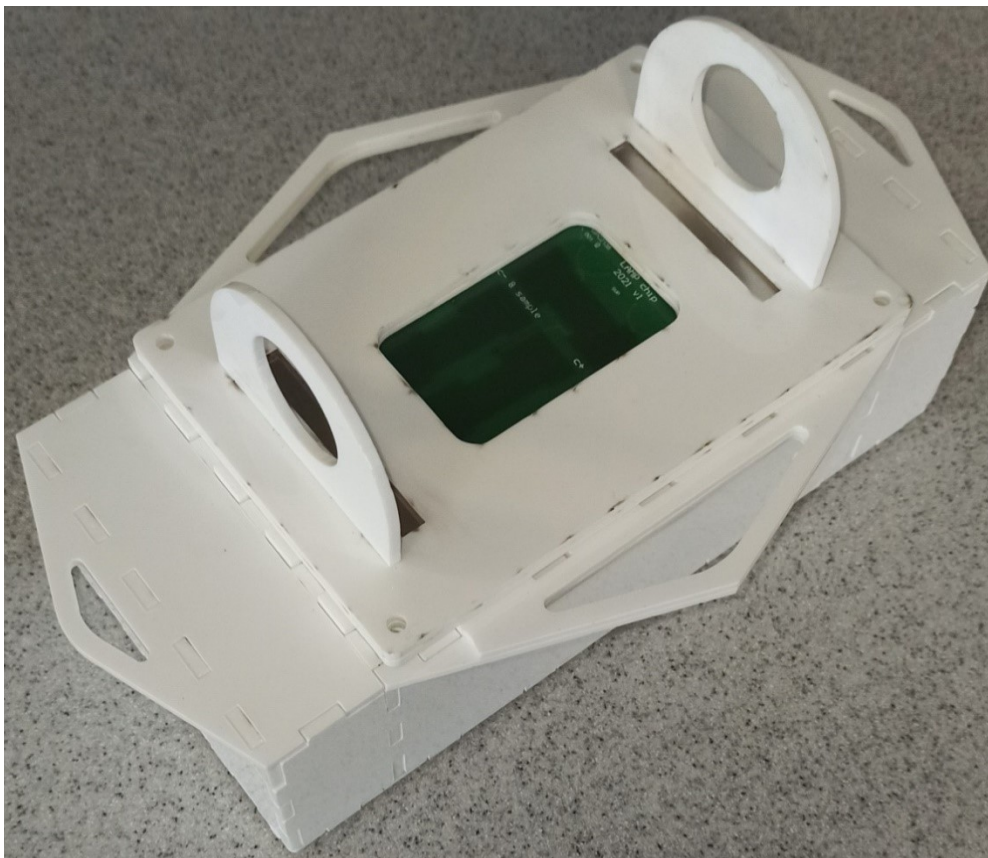
<sup>e</sup>Department of Biochemistry and Metabolism, John Innes Centre, Norwich Research Park, Colney, NR4 7UH, UK.



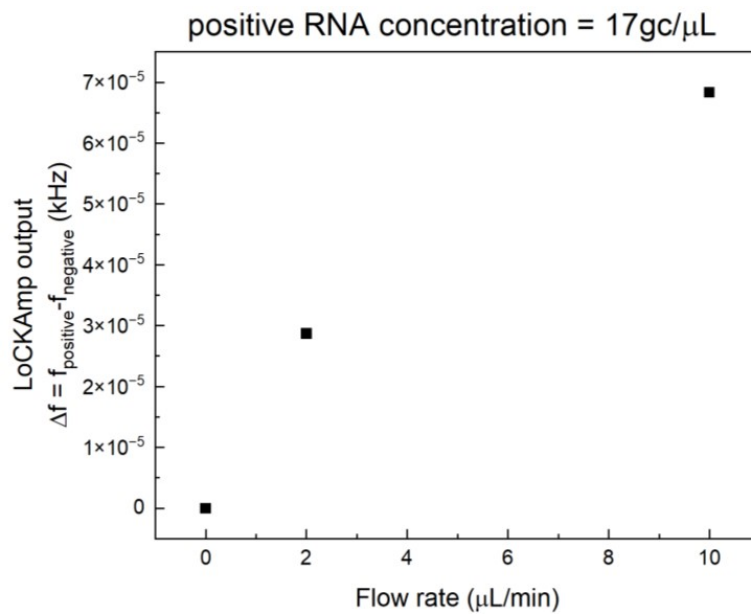
**Supplementary figure 1:** The working principle of the developed optical setup.



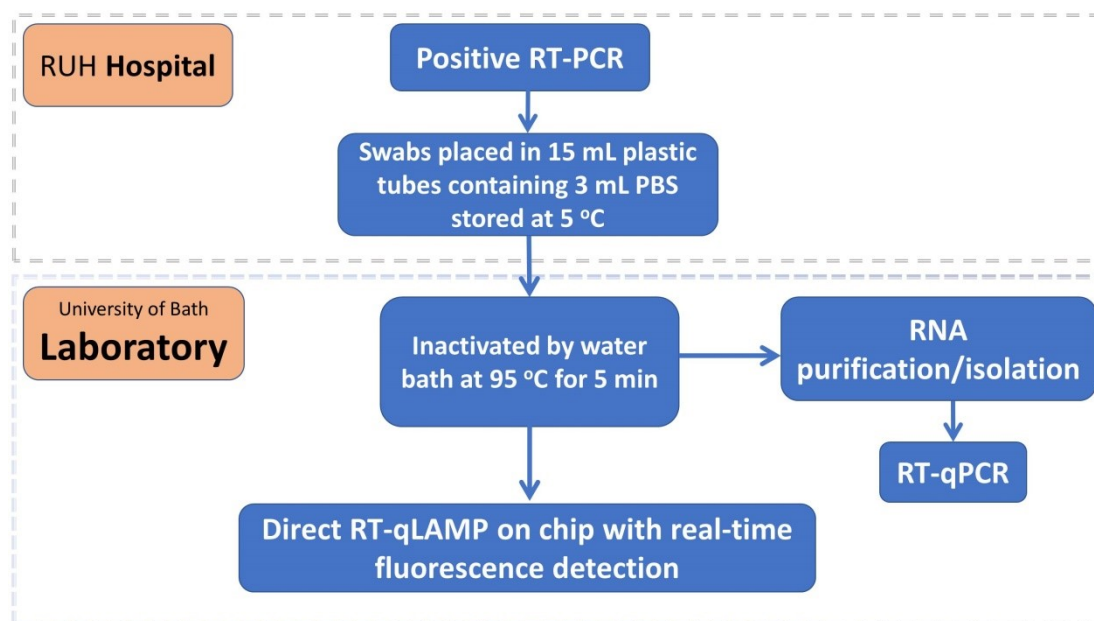
**Supplementary figure 2:** Block diagram of the portable LoCKAmp showing the 1) optical detection circuit/modules, 2) the control circuit for the heaters, the micropumps and the optical setup and finally 3) the micropumps.



**Supplementary figure 3:** Photo of the prototype handheld instrumentation where the miniaturized pump-control and optical-detection circuitry reside. The micro-fluidic PCB is visible at the centre.



**Supplementary figure 4:** Dependency of the fluorescent sensor response on the flow rate of the  $\mu$ LAMP continuously flowed on the PCB.



**Supplementary figure 5:** Clinical study work-flow. Nasopharyngeal samples taken at hospital and transferred to the laboratory were subjected to thermal lysis. Samples were submitted to both RT-qLAMP on chip and conventional RT-qPCR for correlation in the research laboratory.